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PATENT COOPERATION TREATY

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| International filing date (day/month/year) 26 August 1999 (26.08.99) | Priority date (day/month/year) 27 August 1998 (27.08.98) |
| Applicant BIDDISCOMBE, Helen | |

1. The designated Office is hereby notified of its election made:

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| (21) International Application Number: PCT/EP99/06272 (22) International Filing Date: 26 August 1999 (26.08.99) (30) Priority Data: 9818560.6 27 August 1998 (27.08.98) GB (71) Applicant (for all designated States except US): HOECHST TRESPAPHAN GMBH [DE/DE]; Bergstrasse, D-66539 Neunkirchen (DE). (72) Inventor; and (75) Inventor/Applicant (for US only): BIDDISCOMBE, Helen [GB/GB]; Cherry Grove, Newton Road, North Petherton, Bridgwater, Somerset TA6 6SN (GB). (74) Agents: LUDERSCHMIDT, Wolfgang et al.; John-F.-Kennedy-Strasse 4, D-65189 Wiesbaden (DE). | | (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report. | |
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| (54) Title: POLYMERIC FILMS | | | |
| (57) Abstract | | | |
| <p>In-mold labelled, blow-molded articles formed from high density polyethylene, the labels being formed from biaxially oriented polypropylene based films having a shrinkage of at least 4 % in both the machine and transverse directions as measured by the OPMA shrink test in which the film is suspended in an oven at 130 °C for a period of 10 minutes. The use of films with the specified shrinkage enables blistering and "orange peel" effects to be avoided when the blow-molding is carried out.</p> | | | |

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Polymeric Films

This invention concerns polymeric films and in particular the use of such films for the in-mold labelling of articles.

The in-mold labelling of articles, in which a label is incorporated into the surface of an article made from a polymeric material as the article is formed, is a well known technique. Many proposals have therefore been made concerning materials which can be used to form the articles, the materials of which the labels are formed, and the processing conditions under which the articles are formed and therefore labelling itself is effected.

Important factors in achieving satisfactory in-mold labelling are the ability of the label to adhere to the article which is being produced, and also the ability of the label to withstand the processing conditions which are encountered during the formation of the article itself. More particularly, in-mold labelling usually involves subjecting the labels to elevated

temperatures for significant periods of time, this being particularly so with blow in-mold labelling where a polymeric parison is heated to a temperature at which it can be blown into the internal shape of a mold into which a label has previously been placed.

Using polyolefinic parisons, the labels used will themselves usually be formed from polyolefins, polypropylene and polyethylene being widely used as parison materials. Typically films used for the in-mold labelling of polyolefinic parisons are also made from polyolefins, polypropylene based films being widely proposed as being suitable for use in labelling articles made by blow molding either polypropylene or polyethylene parisons.

Typical of the problems encountered using polymeric films as labels for application to articles formed by in-mold blowing of polyolefin parisons using polyolefin films as labels are poor adhesion of the label to the articles, which can be manifest as blisters under the labels, and/or undesirable effects on the labels themselves caused by the heat to which the polymeric films are subjected during formation of the articles, for example distortion and "orange peel" effects.

Many proposals have been made for overcoming such disadvantages, these usually depending on the nature of the polyolefin from which the parisons are made. It should also be appreciated that whereas little or no problems may be encountered using a particular polyolefin film to effect blow in-mold labelling of articles made from parisons of one polyolefin, the same film can suffer the disadvantages referred to above when used in blow in-mold labelling of articles made from parisons of another polyolefin. For example, if conventionally produced films consisting of either a solid or a voided polypropylene homopolymer core layer with two outer layers of a heat sealable propylene ethylene copolymer are used as in-mold labels for articles produced from polypropylene homopolymer parisons, satisfactory adhesion of the label to the article can, in

general, be readily achieved. However, if the same film is used for the blow in-mold labelling of high density polyethylene articles, blistering and/or "orange peel" effects are obtained.

Hitherto proposed methods of overcoming such problems include the provision of layers in the label films themselves which have been suggested compensate for changes in the dimensions of the labels as a result of the heat applied to them by the heated parison, such layers being formed, for example, from foamed or voided polyolefins.

It has also been proposed to use adhesive layers to improve bonding of the labels to the articles. However, the use of such materials complicates production of the films used to produce the labels and it increases their cost.

It has also been proposed that films used to form labels for in-mold labelling should be as dimensionally stable as possible during the in-mold labelling process, which in effect means that as far as possible the films should not shrink during the in-mold labelling process.

According to the present invention there is provided an in-mold labelled, blow-molded article formed from high density polyethylene, the label being formed from a biaxially oriented polypropylene based film having a shrinkage of at least 4% in both the machine and transverse directions as measured by the OPMA shrink test in which the film is suspended in an oven at 130°C for a period of 10 minutes.

Despite the widely held belief in the art that labels for in-mold labelling should have the minimum possible shrinkage when subjected to the temperatures to which they are subjected during in-mold labelling, the present invention is based on the use of films which shrink significantly at such temperatures. The minimum shrinkage in either the machine or transverse direction of the films should be at least 4% as measured by the OPMA shrink test. However, the shrinkages can be more. For

example, the machine direction shrinkage can be at least 5%, more particularly at least 6%, and as much as 7% or more, for example more than 8%. The transverse direction shrinkages can, for example, be at least 5%, more particularly at least 6%, and as much as 7% or more, for example more than 8%.

It is particularly surprising that both blistering and "orange peel" effects can be avoided by the use of films having shrinkages of greater than 4% as measured by the OPMA shrink test in both the machine and transverse directions.

Furthermore, this surprising effect is observed both with polyolefin homopolymer based films having densities of not more than 0.69g/cm^3 , that is voided films, where "orange peel" effects have been a problem with films with shrinkages of less than 4%, and with films with densities of 0.8g/cm^3 or more, where blister formation tends to occur with prior art films.

Films used for in-mold labelling in accordance with the present invention can have any of a wide variety of structures provided they have the required degree of shrinkage. However, they preferably have one or more layers of a propylene homopolymer with at least one outer layer of a heat sealable polymer, the heat sealable polymer being positioned next to the high density polyethylene when the article is blow molded so that the film adheres to the polyethylene of the article. Examples of heat sealable polymers which can be used include copolymers derived from two or more of ethylene, propylene, butene-1 and higher molecular weight α -olefins. Particularly preferred are copolymers of ethylene and propylene, and of ethylene, propylene and butene-1, such polymers preferably containing a major amount of units derived from propylene. When two heat sealable outer layers are present, they can be formed from the same or different polymeric materials.

In addition to at least one outer layer, the films can include at least one intermediate layer, the intermediate layer or layers preferably being formed from at least one polyolefin

which can be a homopolymer but is preferably a copolymer derived from at least two different types of α -olefin and/or ethylene.

When an outer layer is present, the base layer and/or any intermediate layer which may be present preferably contains a hydrogenated hydrocarbon resin, it having been proposed hitherto to use such resins to increase the heat shrinkability of polyolefin films.

The polypropylene homopolymer layer or layers can contain a filler, and such fillers can act as a pigment which serves to opacify the layer or layers in which they are present, for example sub-micronic titanium dioxide, and/or they can act as a voiding agent, for example organic or inorganic fillers having particle sizes of at least 1 μ m, e.g. particulate chalk and polymeric particles such as those formed from polyamides and polyesters.

When a filler is used which induces voiding, the films will usually have densities less than that for polypropylene homopolymers, for example less than 0.9g/cm³, and often less than 0.69g/cm³.

Films used as in-mold labels in accordance with the present invention will can contain additives used in the polymeric film art. Thus they will usually include an antiblock agent in one or both outer surfaces of the films, for example silica or a particulate polyamide, e.g. a nylon. Other additives can also be present in one or more of the layers, for example slip and antistatic agents. Examples of slip agents which can be present include long chain fatty acid amides, e.g. erucamide, and glycerol mono-esters of long chain fatty acids, e.g. glycerol monostearate. Examples of antistatic agents which can be used include polyethoxylated aliphatic amines such as bis-ethoxylated long chain aliphatic amines.

Films used in accordance with the present invention to form labels for blow molded articles can in essence be produced by

known methods, subject to steps being taken to provide them with shrinkages in both the machine and transverse directions of at least 4%. Thus they will in general be produced by coextrusion of melts of the appropriate compositions through a die following which the coextrudate is biaxially oriented.

The biaxial orientation of the films can be effected either simultaneously, for example using the so-called "bubble" process, or sequentially, for example using heated rollers with different peripheral speeds to stretch the films in the direction of extrusion, and then using a stenter oven in which the films are stretched in the transverse direction. However, sequential stretching is generally preferred for reasons which will be explained.

In order to impart the desired degree of shrinkage to the films which are used in accordance with the present invention, it is important to anneal them at lower temperatures than are normally used to produce heat sealable packaging films. More particularly, it is generally preferred to effect sequential stretching of the films so that two annealing steps can be effected, the first after stretching of the films in the machine direction, and then a second after the films have been stretched in the transverse direction, this enabling greater control to be exercised over the respective degrees of shrinkage in the machine and transverse directions. Hence the preference for sequential rather simultaneous stretching, apart from the problems with the latter in producing films including voids in one or more of their layers.

Biaxial stretching of the films used in accordance with the present invention is preferably effected by a factor of from 3.5 to 7:1 in the machine direction and by from 5 to 10:1 in the transverse direction.

Annealing of the films following their being stretched in the machine direction is preferably effected at a temperature of less than 112°C, compared with conventional temperatures in

excess of 115°C, this annealing being more preferably effected at temperatures of less than 105°C, and advantageously less than 100°C, particularly high shrinkages having been achieved at annealing temperatures of about 97°C following stretching of the films in the machine direction, for example at temperatures of about 116°C. Annealing of the films in the machine direction is preferably effected by passing them over the surface of a plurality of rollers each with outer surfaces at the desired annealing temperature, the rollers each having substantially the same peripheral speeds so that the stretched length of the films in the machine direction is substantially maintained during the annealing process, i.e. there is substantially no stretching or relaxation of the film in the machine direction during the annealing process.

Annealing of the films following their being stretched in the transverse direction is preferably effected at a temperature of less than 145°C, compared with conventional temperatures of about 150°C, this annealing being more preferably effected at temperatures of less than 140°C, and advantageously less than 130°C, particularly high shrinkages in the transverse direction having been achieved at annealing temperatures of less than 120°C, and especially less than 120°C following stretching of the films in the machine direction, for example at temperatures of less than 115°C, such as 105°C. Annealing of the films in the transverse direction is preferably effected by passing them over the surface of a number of rollers with outer surfaces at the desired annealing temperature whilst substantially maintaining the stretched width of the films, i.e. it is preferred that there is substantially no stretching or relaxation of the films in the transverse direction during the annealing process.

Once the films have been annealed following their having been biaxially stretched, at least one surface is preferably treated to increase its surface energy, for example by flame or corona discharge treatment, following which it is wound up.

The films can then be printed and cut to the shape and size required for the subsequent blow in-mold labelling process which can be effected in known manner.

Films used as labels in accordance with the present invention can be of a variety of thicknesses, but in general they should be at least 60µm thick to facilitate processing in the in-mold labelling process itself. However, the films will not usually be more than 120µm thick due to mechanical constraints in the formation of biaxially stretched films of such thicknesses.

The following Examples are given by way of illustration only.

Example 1

A three layer polymeric web was by coextruding through a slot die a core layer consisting of a propylene homopolymer containing 6wt% of titanium dioxide with a mean particle size of less than 1µm as a pigment and 2.1wt% of chalk with a mean particle size of 3µm as a voiding agent, with two outer layers each consisting of a propylene/ethylene copolymer (4wt% ethylene) on the surface of the core layer.

The web was cooled and it was then stretched 4.5 times in the direction of extrusion by passing it over heated rollers with differing peripheral speeds, the rollers being heated to a temperature of 116°C. The stretched film was then annealed by passing it over a series of annealing rollers with peripheral speeds substantially the same as that of the last of the rollers effecting stretching in the machine direction, the temperature of these annealing rollers being 97°C.

The mono-axially stretched web was then stretched 8 times in the transverse direction using a stenter oven at a temperature of 159°C, following which it was annealed at a temperature of 105°C with substantially no change in the width of the film.

Thereafter, the film was corona discharge treated on the first outer layer and wound up. The film had a total thickness of 80 μ m, the copolymer layer being 2.5 μ m thick, the terpolymer layer being 2 μ m thick, and the core layer being 76.5 μ m thick.

The film had a shrinkage in the machine direction of 7.6% and in the transverse direction of 11.4% as measured by the OPMA shrink test in which the film is suspended in an oven at 130°C for a period of 10 minutes. The density of the film was 0.8g/cm³.

The film was then cut into labels which were used to label blow molded containers by insertion of the film into the mold before the containers were formed. The labels of the resulting labelled containers showed neither an "orange peel" effect nor blistering.

Example 2 (comparison)

A three layered polymeric film was produced substantially as described in Example 1 except that annealing in the machine direction was effected at a temperature of 116°C and in the transverse direction it was effected at a temperature of 150°C.

The film, which had layer thicknesses and a total thickness as given in Example 1, had a shrinkage of 4% in the machine direction and 0.7% in the transverse direction. The density of the film was 0.8g/cm³.

When used for in-mold labelling under substantially the same conditions used for the film of Example 1, blisters were noticed under the label even though there was no "orange peel" effect.

Claims

1. An in-mold labelled, blow-molded article formed from high density polyethylene, the label being formed from a biaxially oriented polypropylene based film having a shrinkage of at least 4% in both the machine and transverse directions as measured by the OPMA shrink test in which the film is suspended in an oven at 130°C for a period of 10 minutes.
2. An article according to claim 1, wherein the shrinkage of the film in the transverse direction is at least 5%.
3. An article according to either of the preceding claims, wherein the shrinkage of the film in the transverse direction is at least 6%.
4. An article according to any of the preceding claims, wherein the shrinkage of the film in the machine direction is at least 5%.
5. An article according to any of the preceding claims, wherein the shrinkage of the film in the machine direction is at least 6%.
6. An article according to any of the preceding claims, wherein the film comprises a polypropylene homopolymer base layer with at least one outer layer thereon.
7. An article according to claim 6, wherein the outer layer or layers comprises a heat sealable polymer.
8. An article according to claim 6 or claim 7, wherein the base layer contains a hydrogenated hydrocarbon resin.
9. An article according to any of the preceding claims, wherein the film comprises a base layer comprising a propylene homopolymer, at least one intermediate polyolefin layer on the base layer, and an outer layer on the intermediate layer.

10. An article according to claim 9, wherein the base layer and/or the intermediate layer contains a hydrogenated hydrocarbon resin.

11. An-mold labelled, blow-molded article substantially as herein described with reference to Example 1.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/06272

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B29C49/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/06272

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| Applicant HOECHST TRESPAPHAN GMBH et al | |

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REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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PCT/EP 99 / 06272

International Application No.

(26.08.1999)

26 AUG 1999

International Filing Date

EUROPEAN PATENT OFFICE
PCT INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

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(if desired) (12 characters maximum) 98/S001W0

Box No. I TITLE OF INVENTION

Polymeric Films

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

HOECHST TRESPAPHAN GMBH
Bergstrasse
66539 Neunkirchen

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:
DE

State (that is, country) of residence:
DE

This person is applicant
for the purposes of:

☐ all designated
States

☒ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

BIDDISCOMBE, Helen
Cherry Grove
Newton Road
North Petherton
Bridgwater, Somerset TA6 6SN

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box
is marked, do not fill in below.)

State (that is, country) of nationality:
GB

State (that is, country) of residence:
GB

This person is applicant
for the purposes of:

☐ all designated
States

☐ all designated States except
the United States of America

☒ the United States
of America only

☐ the States indicated in
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

LUDERSCHMIDT, Wolfgang; MAI, Peter; OPPERMAN, Frank;
SCHÜLER, Horst; SCHÜLER, Helga; RUPPRECHT, Klaus;
GREIBER, K. Dieter
John-F.-Kennedy-Strasse 4
65189 Wiesbaden

Telephone No.

0611/77844-0

Facsimile No.

0611/77844-77

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

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Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent


- ☒ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria | |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IS Iceland | |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa |
| | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KR Republic of Korea | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> KZ Kazakhstan | <input checked="" type="checkbox"/> CR Costa Rica |
| <input checked="" type="checkbox"/> LC Saint Lucia | <input checked="" type="checkbox"/> DM Dominica |
| <input checked="" type="checkbox"/> LK Sri Lanka | |

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

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| | | | | | |
|--|--|----------------------------------|---|---|--|
| Box No. VI PRIORITY CLAIM | | | | <input type="checkbox"/> Further priority claims are indicated in the Supplemental Box. | |
| Filing date of earlier application (day/month/year) | | Number of earlier application | | Where earlier application is: | |
| | | | | national application: country | regional application: regional Office |
| item (1) 27 AUG 1998 (27.08.1998) | | 9818560.6 | | GB | |
| item (2) | | | | | |
| item (3) | | | | | |
| <input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): | | | | | |
| <i>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</i> | | | | | |
| Box No. VII INTERNATIONAL SEARCHING AUTHORITY | | | | | |
| Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): | | | Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): | | |
| ISA / EP | | | Date (day/month/year) Number Country (or regional Office) | | |
| Box No. VIII CHECK LIST; LANGUAGE OF FILING | | | | | |
| This international application contains the following number of sheets: request : 3 description (excluding sequence listing part) : 9 claims : 2 abstract : 1 drawings : sequence listing part of description : Total number of sheets : 15 | | | This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify): | | |
| Figure of the drawings which should accompany the abstract: | | | Language of filing of the international application: English | | |
| Box No. IX SIGNATURE OF APPLICANT OR AGENT | | | | | |
| Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request). | | | | | |
| <div style="text-align: center;">  Viola Kremer (38057) </div> | | | | | |

| | | | |
|---|--|--|--|
| For receiving Office use only | | | |
| 1. Date of actual receipt of the purported international application: | | (26.08.99) 26 AUG 1999 | |
| 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: | | 2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: | |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2): | | | |
| 5. International Searching Authority (if two or more are competent): ISA / | | 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid. | |

| | |
|---|--|
| For International Bureau use only | |
| Date of receipt of the record copy by the International Bureau: | |



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | |
|--|--|---|
| Applicant's or agent's file reference 98/S001WO | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/EP99/06272 | International filing date (day/month/year) 26/08/1999 | Priority date (day/month/year) 27/08/1998 |
| International Patent Classification (IPC) or national classification and IPC B29C49/24 | | |
| Applicant HOECHST TRESPAPHAN GMBH et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
 - II ☐ Priority
 - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

| | |
|---|--|
| Date of submission of the demand 20/03/2000 | Date of completion of this report 24.11.2000 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized officer Welsch, H Telephone No. +49 89 2399 2907 <div style="text-align: right;">  </div> |

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06272

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

1-9 as originally filed

Claims, No.:

1-11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06272

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 11.

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|------|--------|------|
| Novelty (N) | Yes: | Claims | 1-10 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-10 |
| Industrial applicability (IA) | Yes: | Claims | 1-10 |

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06272

No: Claims

2. Citations and explanations
see separate sheet

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/06272

1. Re item III:

1. Claim 11 is not allowable. According to Rule 6.2(a) PCT claims shall not rely, in respect of the technical features of the invention, on references to the description or drawings.

2. Re item V:

- 1.1 Document US 5 223 315 A (D1) - see particularly col. 1, lines 38 to 47 and col. 2, lines 5 to 10 - deals with the same problem as the present application, namely to improve adhesion of labels made from polyolefin films to articles formed by in-mold blowing/in-mold labelling from polyolefin parisons. Poor adhesion results in blisters under the labels, and/or undesirable effects on the labels themselves caused by the heat to which the polymeric films are subjected during formation of the articles, such as distortion and "orange peel" effects.

The solution to this problem is based in D1 as well as in the present application on the recognition that films which shrink significantly when subjected to the temperatures to which they are subjected during in-mold labelling should be used. This is in contrast to the widely held belief in the art that labels should have the minimum possible shrinkage at such temperatures.

- 1.2 If one compares the subject-matter of claim 1 with the disclosure of D1 it appears that claim 1 is anticipated by D1. (However, since the OPMA shrink test is unknown to the examiner novelty cannot unambiguously be denied.)

In any case, in the light of the previous explanations (at least) nothing inventive can be seen in the subject-matter of claim 1.

2. The additional features of dependent claims 2 to 10 seem to add nothing inventive to the subject-matter of independent claim 1, since their features are either known from D1 or appear to be obvious to one skilled in the art.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | |
|---|---|--|
| Applicant's or agent's file reference 98/S001WO | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/EP99/06272 | International filing date (day/month/year) 26/08/1999 | Priority date (day/month/year) 27/08/1998 |
| International Patent Classification (IPC) or national classification and IPC B29C49/24 | | |
| Applicant HOECHST TRESPAPHAN GMBH et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|---|---|
| Date of submission of the demand 20/03/2000 | Date of completion of this report 24.11.2000 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized officer Welsch, H Telephone No. +49 89 2399 2907 |



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06272

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

1-9 as originally filed

Claims, No.:

1-11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06272

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 11.

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
 - ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet
 - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
 - ☐ no international search report has been established for the said claims Nos. .
2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:
- ☐ the written form has not been furnished or does not comply with the standard.
 - ☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|------|--------|------|
| Novelty (N) | Yes: | Claims | 1-10 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-10 |
| Industrial applicability (IA) | Yes: | Claims | 1-10 |

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

— International application No. PCT/EP99/06272

No: Claims

2. Citations and explanations
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/06272

1. Re item III:

1. Claim 11 is not allowable. According to Rule 6.2(a) PCT claims shall not rely, in respect of the technical features of the invention, on references to the description or drawings.

2. Re item V:

- 1.1 Document US 5 223 315 A (D1) - see particularly col. 1, lines 38 to 47 and col. 2, lines 5 to 10 - deals with the same problem as the present application, namely to improve adhesion of labels made from polyolefin films to articles formed by in-mold blowing/in-mold labelling from polyolefin parisons. Poor adhesion results in blisters under the labels, and/or undesirable effects on the labels themselves caused by the heat to which the polymeric films are subjected during formation of the articles, such as distortion and "orange peel" effects.

The solution to this problem is based in D1 as well as in the present application on the recognition that films which shrink significantly when subjected to the temperatures to which they are subjected during in-mold labelling should be used. This is in contrast to the widely held belief in the art that labels should have the minimum possible shrinkage at such temperatures.

- 1.2 If one compares the subject-matter of claim 1 with the disclosure of D1 it appears that claim 1 is anticipated by D1. (However, since the OPMA shrink test is unknown to the examiner novelty cannot unambiguously be denied.)

In any case, in the light of the previous explanations (at least) nothing inventive can be seen in the subject-matter of claim 1.

2. The additional features of dependent claims 2 to 10 seem to add nothing inventive to the subject-matter of independent claim 1, since their features are either known from D1 or appear to be obvious to one skilled in the art.

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